

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
24 October 2002 (24.10.2002)

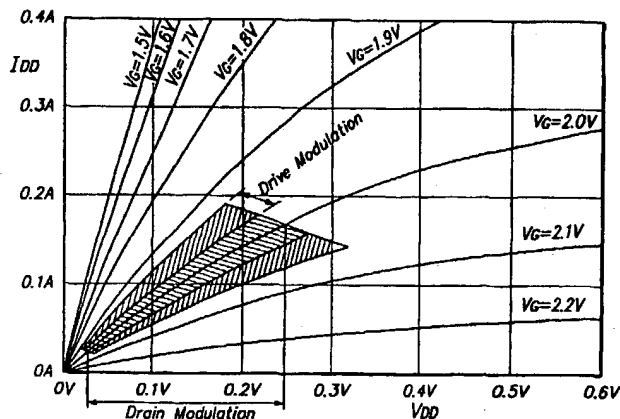
PCT

(10) International Publication Number  
**WO 2002/084864 A3**

- (51) International Patent Classification<sup>7</sup>: **H03G 3/00**, H03F 1/02, 1/32
- (21) International Application Number: **PCT/US2002/011776**
- (22) International Filing Date: 11 April 2002 (11.04.2002)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data: 09/834,024 11 April 2001 (11.04.2001) US
- (71) Applicant (for all designated States except US): **TROPIAN INC.** [US/US]; 20813 Stevens Creek Blvd., Cupertino, CA 95014 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): **SANDER, Wendell, B.** [US/US]; 112 Harwood Court, Los Gatos, CA 95032 (US). **MCCUNE, Earl, W., Jr.** [US/US]; 2252 Sutter Avenue, Santa Clara, CA 95050 (US). **MECK, Ronald, A.** [US/US]; 3630 Old San Jose Road, Soquel, CA 95073 (US).
- (74) Agents: **KREBS, Robert, E.** et al.; Thelen Reid & Priest LLP, P.O. Box 640640, San Jose, CA 95164-0640 (US).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:  
— with international search report
- (88) Date of publication of the international search report:  
12 February 2004

[Continued on next page]

(54) Title: COMMUNICATIONS SIGNAL AMPLIFIERS HAVING INDEPENDENT POWER CONTROL AND AMPLITUDE MODULATION



(57) Abstract: The present invention, generally speaking, provides methods and apparatus for producing an amplitude modulated communications signal, in which a constant-envelope carrier signal is modified in response to a power control signal (204) to produce a modified constant-envelope carrier signal. The modified constant-envelope carrier signal is amplified in response to an amplitude modulation signal (207) to produce a communications signal having amplitude modulation and having an average output power proportional to a signal level of the modified constant-envelope carrier signal. This manner of operation allows wide dynamic range of average output power to be achieved. Because amplitude modulation is applied after amplitude varying circuitry (303) used to produce the modified constant-envelope carrier signal, the amplitude modulation is unaffected by possible non-linearities of such circuitry. In accordance with another aspect of the invention, operation in the foregoing manner at comparatively low average output power levels is combined with switchmode operation at comparatively high average output power levels, enabling high overall efficiency to be achieved. Hence, the disclosed modulator and amplifier combination, in addition to supporting very low power signals, also supports high power signals.

BEST AVAILABLE COPY

WO 2002/084864 A3



*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

BEST AVAILABLE COPY

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 02/11776

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H03G3/00 H03F1/02 H03F1/32

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 H03G H03F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00 48307 A (MCCUNE EARL W ;TROPICAN INC (US)) 17 August 2000 (2000-08-17)	1-6, 11-16, 19-22, 26,27
Y	page 4, line 3-18; figures 2,9 page 11, line 27 -page 12, line 14	7-10,17, 18, 23-25, 28-47
Y	US 6 069 525 A (CAMARILLO RICHARD J ET AL) 30 May 2000 (2000-05-30)  column 3, line 40 -column 4, line 63; figure 1  -/-	7-10,17, 18, 23-25, 28-47

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

\*G\* document member of the same patent family

Date of the actual completion of the international search

7 November 2003

Date of mailing of the international search report

20/11/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Fed1, G

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 02/11776

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 251 331 A (OSMANI RASHID M ET AL) 5 October 1993 (1993-10-05) column 4, line 4-65; figure 2	1-47
A	US 6 043 707 A (BUDNIK BRIAN JOSEPH) 28 March 2000 (2000-03-28) cited in the application column 6, line 3 -column 8, line 9; figures 8,9	1-47

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 02/11776

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 0048307	A	17-08-2000	US 2001014593 A1	16-08-2001
			AU 2876500 A	29-08-2000
			TW 529241 B	21-04-2003
			WO 0048307 A1	17-08-2000
			US 2002090920 A1	11-07-2002
US 6069525	A	30-05-2000	AU 6940698 A	11-11-1998
			JP 2001520828 T	30-10-2001
			TW 456100 B	21-09-2001
			WO 9847222 A1	22-10-1998
			ZA 9803210 A	21-10-1998
US 5251331	A	05-10-1993	CA 2109410 A1	14-09-1993
			CN 1076567 A ,B	22-09-1993
			GB 2270434 A ,B	09-03-1994
			JP 6507774 T	01-09-1994
			MX 9301367 A1	01-09-1993
			RU 2144256 C1	10-01-2000
			WO 9318583 A1	16-09-1993
US 6043707	A	28-03-2000	AU 2368000 A	24-07-2000
			WO 0041296 A1	13-07-2000

BEST AVAILABLE COPY